

# **HEALTH BULLETIN**

**U.S. DEPARTMENT OF ENERGY  
WASHINGTON, D.C.**

Issue 95-01

January 1995

## **Worker Health Study Completed at Los Alamos National Laboratory**

Results from a recent study that analyzed the causes of death for workers from the Department of Energy's (DOE) Los Alamos National Laboratory (LANL) found that workers hired between 1943 and 1977 experienced 37 percent fewer deaths from all causes, and 36 percent fewer deaths due to cancer than expected when compared to death rates in the general U.S. population. Although study researchers recognize that employed populations are on average healthier than the general population--this phenomenon is known as the "healthy worker effect"--they concluded that causes of death and death rates for these workers were too low to be explained by the healthy worker effect. This study was conducted to determine whether plutonium deposition and radiation doses received as a result of exposure to external ionizing radiation were related to the number and causes of deaths among workers. This study makes an important contribution to the body of scientific knowledge on the human health effects of occupational exposure to radiation. The study is published in the December 1994 issue of the journal, Health Physics (67[6]:577-588;1994).

Scientists know very little about the human health effects of occupational exposure to plutonium. In animals studies, plutonium causes cancer of the bone, lung, and liver. Although scientists have studied the health effects of large doses of external ionizing radiation less is known about the effects of low-level occupational exposures.

In this study, researchers identified 15,727 white males, including Hispanics, who were hired at LANL between 1943 and 1977. Only white and Hispanic males were included because of the small numbers of nonwhite male workers employed at the time. Death certificates provided information on the date and

cause of death. Researchers then identified a subset of 3,775 workers who had been monitored for plutonium exposure. A review of their urine bioassay information indicated that 303 workers in this subset had enough plutonium in their bodies (more than 2 billionths of a curie) to be categorized as "exposed," the rest were considered "unexposed."

The overall mortality was similar in the plutonium exposed group and the unexposed group. Researchers found 22 cases of cancer in the 303 plutonium exposed workers and 125 cancers in the 3,472 unexposed workers. The researchers then examined different types of cancer and noted one case of rare bone cancer (osteogenic sarcoma) in the plutonium exposed group, which is consistent with findings from animal studies. After taking into account the differences in age, year of death, and the minimum amount of elapsed time between an exposure and the identification of cancer, known as the "latency period," the rates of cancer did not differ significantly between the two groups of workers. They also observed one case each of bladder and oral cancer in the exposed group, which was higher than expected but not statistically significant. The number of lung cancer deaths (eight cases) was slightly higher in the exposed group than the unexposed group, but because researchers did not have information on cigarette use, they could not determine whether factors, such as smoking habits, influenced the higher rate of lung cancer observed in the exposed group.

When researchers examined data for the 10,182 workers who were monitored for exposure to external ionizing radiation, including 245 workers who were also exposed to plutonium, they found that as doses increased so did the number of deaths from cancers of the brain and central nervous system, esophagus, and Hodgkin's disease. However, the types and numbers of cancer deaths for this group of workers were still below the expected number of deaths based on statistics for the U.S. population. Esophageal cancer has been reported in atomic bomb survivors and in people who receive high doses of radiation during medical treatment. Hodgkin's disease is not known to be related to radiation exposure. Workers who had been exposed to both plutonium and external ionizing radiation were excluded from some analyses so that the effects of external ionizing radiation could be evaluated separately. When the workers who had been exposed to plutonium, as well as external ionizing radiation, were excluded from the analysis, deaths from kidney cancer and lymphocytic leukemias also increased as the dose of external ionizing radiation increased.

DOE in cooperation with the National Institute for Occupational Safety and Health will continue to evaluate the health of its current and former employees and make these findings publicly available. For a copy of the study article,

"Mortality Through 1990 Among White Male Workers at the Los Alamos National Laboratory: Considering Exposures to Plutonium and External Ionizing Radiation," published in the December 1994 issue of Health Physics, please inquire with your local DOE reading room or contact the Office of Epidemiologic Studies at (301) 903-5328. For extra copies of this Health Bulletin, please contact Patricia Barbosa Ekman of the Office of Epidemiologic Studies at (301) 903-7771.

This Health Bulletin is one in a series of routine publications issued by the Office of Health Studies to share data from health studies throughout the DOE complex. The authors' conclusions do not necessarily reflect those of the Department. For more information contact: Patricia B. Ekman, Office of Epidemiologic Studies, U.S. Department of Energy, Washington, D.C. 20585; Telephone (301) 903-7771.